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Predictors of Willingness of the Sheltered Homeless to Be Screened for Hepatitis C

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Predictors of Willingness of the Sheltered Homeless to Be Screened for Hepatitis C

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Abstract

Background. Homeless individuals are at high risk of contracting the Hepatitis C virus (HCV) given that many use intravenous drugs or have a prison history, common risk factors for the disease. Although there is no vaccine, it is curable.

Methods. This cross-sectional study surveyed residents (n=120) of five homeless shelters in Connecticut to understand their screening willingness and knowledge about HCV.

Results. Those who tested previously (OR=0.46, 95% CI 0.23-0.90) and those who had never spent time in prison (OR=0.39, 95% CI 0.15-0.98) were less willing to be screened. Most did not recognize HCV symptoms and risk factors.

Conclusions. The study revealed that 12.5% of those surveyed have HCV and 60% had been to prison. Although 67.8% indicated HCV knowledge, the mean grade on the quiz was 48.6%.

Discussion. 92.5% had been to a doctor within the past year, yet HCV and screening do not appear to have been discussed.

Contents

Foundational and Concentration Competencies

This thesis addressed the following foundational and concentration competencies required for the Master of Public Health Sciences program. The table below outlines the specific competencies and how they were fulfilled.

Foundational Competency	How Addressed in the Thesis
2. Select quantitative and qualitative data collection methods appropriate for a given public health context	A self-administered original survey was the primary means of data collection. The 28-question survey included both quantitative and qualitative data.
3. Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate	The researcher leveraged the statistical software SAS v. 9.4 to analyze the survey results, which were both quantitative and qualitative.
4. Interpret results of data analysis for public health research, policy or practice	The results of the data analysis provided opportunities for not only additional public health research but also changes to policies of screening for Hepatitis C and the practice of educating the homeless population during provider visits.
7. Assess population needs, assets and capacities that affect communities' health	This survey assessed the needs for screening locations and knowledge of Hepatitis C among those experiencing homelessness that if improved, could impact this public health concern.
9. Design a population-based policy, program, project or intervention	The thesis analysis provides the data and groundwork to propose a population-based policy, program, or intervention to better educate this population as to their risks of the disease, as well as the opportunity to create more screening programs and insurance coverage for treatment.
19. Communicate audience-appropriate public health content, both in writing and through oral presentation	The e-poster and supporting content provides an example of communicating the research and health content to a broad audience.
22. Apply systems thinking tools to a public health issue	Leveraged a holistic approach to understand the issue, the contributing factors, and proposed next steps that require a multi-faceted approach to address the problem. This thesis explored a multitude of components and sought to address the issue by exploring the 'system' of homelessness.

Systems Thinking

This thesis applied a systems thinking framework by taking a holistic approach to the public health concern that people experiencing homelessness are more likely to have Hepatitis C. This study employed the disciplined approach to understand the problem of what prevents or inhibits this vulnerable population from seeking screening tests by exploring a variety of factors that contribute to the 'system' of homelessness and understanding which variables may affect other factors. This thesis leveraged a 28-question survey to better understand if any patterns or trends existed which would help identify any underlying structures or predictors that drove those trends. The goal was to view a broader perspective of the situation before proposing any recommendations. By understanding the situation more fully, the researcher was able to ask richer questions when crafting possible solutions. The ability to recognize the inter-related components, such as the various demographic characteristics and the homeless duration and experiences, combined with access to healthcare, prison history, and past testing experience, provided a broader view of the challenges faced by this population. This research identified inter-related components that must be addressed in order to create a viable, long-term solution.

Hepatitis C is a chronic, deadly disease and an important public health concern. The goal of leveraging a systems thinking approach is to discover new ways of thinking about this problem and ultimately to propose solutions that will identify new ways to think about the various factors that contribute to homelessness and a person's willingness to be screened. The goal of taking a systems approach is to find creative solutions that will improve not only the education of the risks and transmission of this disease, but to increase screening tools to deepen the understanding of the prevalence and need for treatment in this vulnerable population.

Background

Hepatitis C is a chronic blood-borne liver infection caused by the Hepatitis C virus (HCV), and according to the World Health Organization (WHO), more than 71 million people worldwide affected (WHO, 2016). Since its discovery in 1989, HCV has become recognized as the leading cause of chronic liver disease globally (Aisyah et al., 2018), which can culminate in liver failure and death. In order to eliminate this public health threat, the WHO has identified a target date of 2030 to accomplish this task. In the United States, it is estimated that approximately 2.4 million people have the disease, according to the most recent data by the Centers for Disease Control and Prevention (CDC) (Hofmeister et al, 2019). This count is likely a significant underestimate, as the marginalized populations that are prone to experience high prevalence of the disease, namely those experiencing homelessness and prison populations, are often not included in surveys. The true burden of this disease is not fully known without inclusion of the data from these populations. Several studies estimate that the prevalence of HCV in the homeless populations in the United States ranges between 3% and 75% (Hofmeister at al., 2019; Jain et al., 2019; Page et al., 2017), although these estimates vary by age.

Intravenous drug use is the most common risk factor of Hepatitis C in developed countries, particularly when users share needles or other injection equipment (Read et al., 2017). People in prisons or other enclosed environments, those who have received transfusions of unscreened blood, people with sexual partners who have HCV, or people with piercings and tattoos are also highly vulnerable (WHO, 2016). Although there is no vaccine for Hepatitis C, the disease is curable via direct acting antivirals (DAAs). The treatments have changed over time and are now much more effective and have fewer side-effects than the previous interferon-

containing regimens. Both screening methods and treatments have improved over the past few years, and the treatment guidelines continue to be updated to reflect the latest practices.

Hepatitis C can cause both acute and chronic hepatitis and is the leading cause of liver cancer. Although a small number of cases spontaneously clear without any intervention, between 70% and 85% of cases become chronic conditions that can be life-threatening without medical intervention (CDC, 2019). Early detection and treatment are essential in preventing the spread of this contagious virus. Moreover, ensuring access to Hepatitis C screening and treatment among intravenous drug users, many of whom are homeless, could substantially reduce HCV transmission and have significant public health benefits.

The goal of this descriptive study is two-fold. This study first explores how much those experiencing homelessness know about Hepatitis C and secondly examines which factors are associated with the willingness of a person experiencing homelessness to be screened for Hepatitis C. The research helps identify whether age, gender, race, ethnicity, education, history and duration of homelessness, location of screening test, and awareness of health risks of Hepatitis C are associated with a disposition to be screened for HCV.

Literature Review

This section describes the similarities and differences in the existing literature and research on the screening and treatment of Hepatitis C among the homeless population. Since both homelessness and Hepatitis C are global issues, many of the articles describe research in other parts of the world including Europe, Australia, the Middle East, and Canada. The generalizability of these findings to all the homeless is unclear, as more research would need to be conducted to understand populations in different regions of the US and other countries. Even within the United States there may be differences among those experiencing homelessness amid

the different geographic areas that would warrant further investigation (Aisyah et al, 2018; Read et al 2017).

In the review of literature on homelessness and Hepatitis C screening and treatment, there are many consistent findings. Nearly all the studies conclude that people experiencing homelessness are disproportionately affected not only by drug use, but also by their ability to access healthcare, because this vulnerable population experiences high rates of social and racial inequities (Aisyah et al., 2018; Fuster & Gelberg, 2019). The literature consistently finds that being homeless limits the ability to receive medical care for HCV (Fuster & Gelberg, 2019). A few of the studies conclude that there are often coinfections with human immune-deficiency virus (HIV) and/or Hepatitis B virus (HBV) (Fuster & Gelberg, 2019; Page et al., 2017) among the homeless.

Most researchers indicate that it is difficult, for many logistic considerations, to study people who inject drugs (PWID) among the homeless in order to accurately assess the prevalence of HCV (Fuster & Gelberg, 2019), and more epidemiological research may be needed to fully understand the HCV burden among these and other marginalized populations in the U.S. This literature review demonstrates a consensus that the most common risk factors among the homeless for HCV are drug use and imprisonment (Aisyah et al., 2018; Brown et al., 2019). People experiencing homelessness often cite active drug use, fear of side effects, being in prison, or forgetfulness of the appointment as reasons why they do not attend screening and/or treatment clinics (Lambert et al., 2019). There is also unanimity in the finding that people experiencing homelessness have high emergency room utilizations and are less likely than their housed counterparts to seek regular primary care (Fuster & Gelberg, 2019).

Gaps in the Literature

Most of the research on homelessness focuses on men, which is representative of the majority of the homeless population. According to the U. S. Department of Housing and Urban Development, nearly 553,000 people experienced homelessness in the United States in 2018, and more than 70% of those were men (U.S. Department of Housing and Urban Development, 2018). While men comprise most of this population, only a handful of studies research HCV among women and youth, with youth defined as those aged 18 to 24 years of age. These studies identify potentially unique needs for both screening and targeted treatment strategies for youth and women (Page et al., 2017).

Research also identifies the most vulnerable population for HCV to be those born from 1945 to 1965, also known as the 'baby boomers' (Jain et al., 2019). One study also claims that this population, in general, is five times more likely to be infected with HCV than their younger counterparts (Jain et al., 2019). While this demographic may still be of high concern for Hepatitis C, the advent of the opioid crisis has created a new potential concern for the younger population as well. There is scant research that focuses on this newer generation and the challenges with PWID resulting from the use of opioids.

To our knowledge, no research has addressed the willingness of the homeless to undergo screening, which, therefore, is the primary aim of the study. Additionally, this study aims to learn if knowledge of Hepatitis C, and its risk factors, among the homeless population is related to their willingness to be screened. Lastly, we will examine if knowledge and willingness are greater among baby boomers as compared to younger persons in the shelters. We aim to evaluate whether or not baby boomers might have a greater understanding of issues related to Hepatitis C compared to the younger population.

Methods

Study Design and Sample

This investigation is an observational cross-sectional study of homeless persons (n=120) ages 18-71 residing in five shelters in Hartford, New London, New Haven, and Waterbury, in which an anonymous self- administered survey was given that measured several factors to determine the level of awareness of the homeless population about Hepatitis C as well as their willingness to be screened, as described in more detail below. Shelters were selected based on the following criteria: county location in order to achieve statewide representation; and age and sex composition (men only, co-ed, youth). Several additional shelters across the state were contacted to participate in the study but did respond in time to participate despite follow-up emails and phone calls. Many of the shelters are operating with a minimal staff and are extremely busy and simply missed the invitations. Several shelter directors indicated to the researcher afterwards that they would have participated had they seen the emails or received the phone calls, and that they were very interested in participating in any future research. The goal was to have at least one shelter in each of the seven Coordinated Access Network (CAN) in the state, yet the researcher was able to obtain representation from four of the CANs, as two shelters were located in New Haven. Due to time constraints, no further adjustments were made to gain representation from each CAN in this study.

The study participants consisted of 82 homeless men (68.3%), 37 women (30.8%) and one transgender person. Of this population, 10 were classified as youth defined by the Housing and Urban Development (HUD) between the ages of 18 and 24 (HUD, 2018). Only 5% (n=6) of the respondents requested Spanish surveys, with 95% of majority (n=114) requesting English surveys.

Nearly 30% of shelter residents in the past year in CT were Hispanic (of any race), half of the population White (47.9%), and 40% Black (40.3%) (CTHMIS, 2020). The majority of shelter residents are aged 25 54 (56%), with both youth (7.1%) and clients over 62 (5.9%) having a much smaller representation (CTHMIS, 2020). Data on the unsheltered population is not possible to define with accuracy, as they are not often known to the statewide agencies and providers who assist the homeless and are therefore not accurately represented in the state of Connecticut's homeless management information system (HMIS).

Inclusion/Exclusion Criteria

The sampling frame consisted of shelters in Connecticut, and we sought to obtain a representative sample by including a location in multiple counties. Within each shelter, however, data were collected from a convenience sample of residents, i.e., those willing to take the survey during a single visit at the location. We included persons 18 years and older because children are not likely to have awareness of Hepatitis C nor opinions about treatment or screening. Unsheltered homeless were not part of the sampling frame primarily due to the challenges with finding them in the desired timeframe to complete the research. The unsheltered are often found under bridges, in encampments, or in other areas not fit for human habitation Exclusion criteria included those who appeared to not have cognitive competence in addition to submitted surveys that were massively incomplete.

Survey Distribution and Content

The study was approved by the UCONN Health Institutional Review Board (IRB) with written approval from each shelter and anonymity of participants as conditions of approval. Based on the suggestion of each shelter, the researcher arrived usually around 5pm or 6pm for dinner service to capture the largest potential population or 6:30am for the breakfast service as

preferred at one shelter. The researcher asked each participant if they were willing to take the survey, reiterated that it was optional and that any question could be skipped before handing over the paper survey and a pen. Depending upon the shelter layout, the researcher either left the box unattended for two hours while remaining at the shelter or stood near the box while the participants completed the survey and directed them to put it in the box once completed. In two shelters the shelter staff assisted in administering the surveys. The survey was voluntary, administered anonymously, and was originally estimated to take no more than 10 minutes to complete; however, most respondents took about 20 minutes to complete the survey.

The 28-question survey (Appendix A) consisted of three main sections: 1) demographics, 2) Hepatitis C risk and knowledge, and 3) likelihood to get screened in various locations (hospital, community health clinic, shelter). The demographic questions included age, gender, race, ethnicity, highest level of education completed, the date the respondent arrived at the shelter, and how long the respondent has been homeless. The questions relating to risks and knowledge about Hepatitis C included whether the person knows what Hepatitis C is, if he/she has ever been tested for Hepatitis C, and whether they have Hepatitis C. The survey included a ten-question 'quiz' regarding facts about transmission, symptoms, and treatment to which respondents indicated either True, False, or Unsure to convey their understanding of the virus.

The final section of the survey asked questions about the likelihood of the respondent to attend a Hepatitis C screening at various locations, in addition to their intention to get treatment if the screening tested positive, as well as their desire to get help to stop substance use, if applicable.

There was no compensation or incentive provided to complete the anonymous survey.

Privacy and Confidentiality

The survey did not contain any sensitive questions that would warrant the need for privacy measures; given the locations in which these surveys were completed, it would have been difficult to ensure a completely private area to take the survey. The researcher was the only person with access to the completed surveys and was the only person entering and storing the data. There was no personally identifiable information captured on the survey. There was a single health-protected information question pertaining to whether or not the person had Hepatitis C, and the researcher obtained prior Health Insurance Portability and Accountability Act (HIPAA) approval during the IRB process.

Adequate Consent Procedures

The survey included a paragraph that stated the purpose and goals of the procedure, as well as a brief description of the research question being studied. Moreover, the privacy and confidentiality details were clearly outlined and indicate that participation was completely voluntary.

Data Analysis

Descriptive statistical analyses included Chi-square tests to evaluate associations between categorical variables, and calculation of correlation coefficients between continuous variables. Logistic regression was performed to identify which independent variables (e.g., age, sex, knowledge of Hepatitis C), predicted whether or not they would be willing to undergo screening for Hepatitis C as measured by a dichotomous level (yes, no). Odds ratios were used to assess magnitude of the associations.

The questions regarding the participant's willingness to go to various locations to be screened, originally asked using a 5-point Likert scale, were each converted into a binary

variable. The responses of '5 – Very Likely' and '4-Somewhat Likely' were converted into a binary variable 'Yes'. The response '1 – Not at all likely' and '2 – Somewhat unlikely' were converted to a 'No' response. The '3' values were excluded as they were neutral values. The ages of the participants were grouped into four categories for the analysis: 18 to 24, 25 to 30, 31 to 50, and over 51 years. For the Chi square analysis, however, the age grouping of 18 to 24 were grouped with 25 to 30 in order to meet the small cell size requirement. Likewise, the education levels were grouped into four categories: completed college, completed some college, completed high school or general education diploma (GED), and completed 11^{th} grade or lower. The quiz scores were calculated on a 10-point scale, with one point for each correct answer.

The dependent variable (i.e., willingness of a person experiencing homelessness to be screened for HCV) was operationalized by asking participants the likelihood that they will get screened at a hospital, a local health clinic, or at their local shelter using a 5-point Likert scale ranging from 1 (not at all likely) to 5 (very likely). The independent variables included age, gender, race, ethnicity, previous prison history, duration of homelessness, highest education level completed, whether they knew about Hepatitis C, if they had ever been tested for it, if they had Hepatitis C, and awareness of the health risks of Hepatitis C.

Since the dependent or outcome variable is binary ('Yes' or 'No' as to whether the person experiencing homelessness is willing to get screened for Hepatitis C), and given that the independent variables are both continuous and categorical, a binary logistic regression analysis was the appropriate analytic method to predict the odds of being a case. Binary logistic regression has several assumptions that must be met, including that the observations are independent of each other, that there is little or no multicollinearity among the independent variables, and linearity of the independent variables and log odds.

The data analysis for this paper was generated using SAS software. Copyright © 2016 SAS Institute Inc. SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc., Cary, NC, USA.

Number of Variables per Participant

We attempted to follow recommendations that there be at least 10 cases per predictor variable in a multivariate analysis (Green, 1991). Since there were fourteen possible predictor variables, this study strived to attain a minimum of 140 participants. Ultimately, however, we included a maximum of six variables in the largest model analyzed. Given the lower than expected shelter response rate (n=5), combined with the three surveys that were rejected due to language challenges, the final usable number of surveys was 120. Reasons for rejection (n=3): no questions were completed; only a few questions answered but with multiple answers selected for each question; and a survey from a woman who verbally struggled to understand the questions, including age and gender.

Results

As presented in Table 1, the mean age was 43.9 (SD=13.5), the median age was 43.5, and the mode age was 43.0 years representing a normal distribution. This study revealed a point prevalence of Hepatitis C among this sample population of 12.5% (n=15), although the general population prevalence is estimated to be only 1% (CDC, 2020).

Forty-six percent of those taking the survey identified as White/Caucasian (n=80), while 26% (n=30) identified as Black. Two survey respondents identified their race as 'Puerto Rican' although this was not an option on the survey, and 5 individuals did not identify any race. Three shelters had more white respondents than black, one shelter had more black than white, and one shelter had an equal amount of black and white clients.

Nearly three quarters (n=80) indicated their ethnicity is non-Hispanic/non-Latino with the remaining 25% (n=28) claiming to be Hispanic or Latino.

More than half (n=62) of those screened reported that they had been to prison. This actual number, however, is likely to be higher as several participants may not have wished to reveal this on the survey.

Table 1. Demographic Characteristics of Study Sample

Demographic	n (%)
Age (yrs)	
All (mean +/- STD)	43.9 (13.5)
18 - 24	10 (8.5)
25 to 30	13 (11.0)
31 to 35	16 (13.6)
36 to 40	9 (7.6)
41 to 45	17 (14.4)
46 to 50	9 (7.6)
51 to 55	14 (11.9)
56 to 60	14 (11.9)
61 to 65	12 (10.2)
66 and older	4 (4)
Gender	
Male	82 (68.3)
Female	37 (30.8)
Transgender	1 (0.8)
Race	
White/Caucasian	53 (46.1)
Black	30 (26.1)
American Indian/Alaskan Native	6 (5.2)
Asian/Pacific Islander	2 (1.7)
Multiple Races	17 (14.7)
Ethnicity	
Non-Hispanic/Non-Latino	80 (74)
Hispanic/Latino	28 (26)
Highest Education Completed	
Graduated College	15 (12.8)
Some College	27 (23.1)
Graduated High School	39 (33.3)
11th Grade	11 (9.4)
10th Grade	12 (10.3)
9th Grade or Lower	12 (10.3)
Did Not Attend School	1 (0.9)

Length of Stay at This Shelter	
Less Than One Week	13 (10.8)
One Month	34 (28)
2 to 6 Months	34 (28)
6 to 12 Months	5 (4.2)
More Than a Year	11 (9.2)
Length of Homelessness	
Less Than One Week	8 (6.8)
One Month	19 (16.2)
2 to 6 Months	29 (24.8)
6 to 12 Months	12 (10.3)
More Than a Year	49 (41.9)
Been to Prison	
Yes	62 (51.7)
No	49 (40.8)
Prefer Not to Answer	9 (7.5)
Know What Hep C is?	
Yes	83 (69.2)
No	24 (20.0)
Not Sure	13 (10.8)
Where Hear about Hep C?	
Doctor	45 (51.1)
Friend	4 (4.6)
Family	5 (5.7)
Other	34 (38.6)
Ever Tested for Hep C?	
Yes	80 (67.8)
No	27 (22.9)
Don't Know	11 (9.3)
Do You Have Hep C?	
Yes	15 (13.0)
No	88 (76.5)
Don't Know	12 (10.4)
Prefer Not to Answer	0 (0)
Most Recent Doctor's Visit	
Within the Past Month	66 (55.5)
Within the Past 6 Months	31 (26.1)
Within the Past Year	13 (10.9)
Not Seen in the Past Year	4 (3.4)
Not Seen in the Past 5 Years	5 (4.2)
How Likely Are You To:	
Get Screened at a Hospital	
Not at all Likely	32 (28.8)
Somewhat Unlikely	9 (8.3)
Neither Likely nor Unlikely	10 (9.0)
Somewhat Likely	22 (19.8)

Very Likely	38 (34.2)
Get Screened at a Health Clinic	
Not at all Likely	27 (25.0)
Somewhat Unlikely	9 (8.3)
Neither Likely nor Unlikely	13 (12.0)
Somewhat Likely	23 (21.3)
Very Likely	36 (33.3)
Get Screened at Your Shelter	
Not at all Likely	38 (34.6)
Somewhat Unlikely	10 (9.1)
Neither Likely nor Unlikely	9 (8.2)
Somewhat Likely	21 (19.1)
Very Likely	67 (29.1)
Get Treatment if I Had Hep C	
Not at all Likely	16 (14.7)
Somewhat Unlikely	4 (3.7)
Neither Likely nor Unlikely	9 (8.3)
Somewhat Likely	13 (11.9)
Very Likely	67 (61.5)
Seek Help to Stop Substance Abuse	
Not at all Likely	27 (25.7)
Somewhat Unlikely	2 (1.9)
Neither Likely nor Unlikely	10 (9.5)
Somewhat Likely	8 (7.6)
Very Likely	58 (55.2)

The majority of survey respondents, 33.3%, had a high school education or GED equivalent (n=39), with 23% (n=27) indicating they had attended some college, 12.8% (n=15) having attended college, and the remainder of the participants had completed 11th grade or below. Only one person indicated that they did not attend school at all.

Forty-eight percent of the respondents (n=56) noted that they have been homeless fewer than six months, while 41.9% (n=49) indicated they have been homeless for over a year. Ten percent (n=12) said they have been homeless six to twelve months.

Over half of the participants indicated they had seen a doctor within the past month (n=66), and nearly a quarter said they seen a doctor within the past six months (n=31). In sum, 92.5% of the people had had a doctor's visit within the past year (n=110). Only 3.4% (n=4) had

not seen a doctor in the past year, and 4.2% (n=5) had not been to the doctor's in the past five years.

When asked about likelihood to get screened for Hepatitis C at various locations, most responses were equally divided among those who indicated they were 'Not at all likely' or 'Very likely' – the two opposite responses. For likelihood to get screened at a hospital, 28.8% (n=32) indicated they were not at all likely while 34% (n=38) were very likely. For screenings at a health clinic the results were similar: 25% (n=27) were not at all likely while 33% (n=36) were very likely. For shelter screenings, 34% (n=38) were not at all likely compared to 29% (n=67) were very likely.

The responses were overwhelmingly favorable for likelihood to get treatment if the screening showed the person had the disease. Over 60% (n=67) said they would be very likely to seek treatment if they had the disease, while only 14.7% (n=16) noted they would be not at all likely to get treatment. When asked if they would seek help to stop substance abuse, if they had it, 55.2% (n=58) answered they would be 'very likely' to do so, while 25.7% (n=27) said they would not at all be likely to do so.

Knowledge of Hepatitis C

Of the ten questions in the survey, the three questions that received the highest correct responses as shown in Table 2 include: knowing that a common method for Hepatitis C infection is by sharing needles and other equipment to inject drugs (83.0%) understanding that Hepatitis C is a highly contagious disease (72.5%), and that Hepatitis C is a serious, long-term illness if not treated (65.8%). The three least known facts appear to be correctly knowing that there is no vaccine (18.3%); not knowing that Hepatitis C only affects the liver (27.5%); and that treatment

for the disease involves taking more than one pill (32.5%), with more than three-quarters of the participants not realizing it is a multi-week treatment.

The mean score for the 10-question Hepatitis C section (i.e., the percentage of correct answers) was 48.6% as shown in Table 3, indicating that this population does not know as much as perhaps it thought about Hepatitis C despite being a vulnerable group for the disease. The question 'Do you know what Hepatitis C is' that was asked earlier in the survey, however, showed that 69% (n=83) indicated that they did. Moreover, the fact that more than 92.5% (n=110) of all survey respondents reported going to a doctor within the past year or less indicates that discussions about Hepatitis C may not be occurring.

Table 2. Hepatitis C Quiz Correct Responses

Question #	**Question**	**n (%) Correct**
Q1	Hepatitis C is a contagious disease.	87 (72.5)
Q2	Fatigue is a common symptom of early stages of Hepatitis C.	55 (45.8)
Q3	A common way people become infected with Hepatitis C is by sharing needles and other equipment to inject drugs.	100 (83)
Q4	There is a vaccine for Hepatitis C.	22 (18.3)
Q5	Hepatitis C is a serious, long-term illness if not treated.	79 (65.8)
Q6	Most people who have Hepatitis C do not feel sick.	50 (41.7)
Q7	If I already had a Hepatitis C screening test in the past I do not need to be tested again.	57 (47.5)
Q8	There is no benefit to getting treatment for Hepatitis C if I continue to use intravenous drugs.	54 (45)
Q9	Hepatitis C only affects the liver.	33 (27.5)
Q10	Treatment for Hepatitis C involves taking only one pill.	39 (32.5)

Appendices C through E show each of the responses to the ten questions of the Hepatitis C quiz by gender, education level, and age.

Table 3. Hepatitis C Quiz Mean and Median Scores

		Mean Correct Score	**Median Score**
All		48.6%	55%
Gender	Male	45.7%	50%
	Female	52.9%	60%
Education Level	Graduated from College	56.0%	60%
	Some College	49.6%	60%
	High School or GED	47.2%	50%
	11^{th} Grade or Lower	44.6%	50%
Age	18 to 24 Years	39.2%	45%
	25 to 30 Years	44.6%	50%
	31 to 50 Years	50.4%	50%
	51 Years and Older	48.6%	55%

Using a 70% quiz score as an arbitrary minimum 'passing' grade, the results varied by strata. As shown in Table 3, women had slightly higher median and mean scores as compared to their male counterparts. Those with a college degree scored the highest, followed by the individuals who attended some college. The participants with a high school education or GED scored slightly higher than those with an 11^{th} grade education or lower, both groups in the bottom half of the rankings. From an age perspective, those aged 18 to 24 scored the lowest whereas those 31 to 50 achieved the highest scores.

Table 4. Willingness to be Screened for Hepatitis C by Demographic Factor

Variable	Willingness to be Screened for Hepatitis C		P value
	YES	NO	
Male	67.1 %	32.9 %	0.45
Female	74.3 %	25.7 %	
Ages 18-30	5.4 %	3.2 %	0.88
Ages 31-50	34.4 %	3.2 %	
51 and older	29.0 %	16.1 %	
White/Caucasian	70.2 %	29.8 %	0.50
Black	70.8 %	29.2 %	
Hispanic	66.7 %	33.3 %	
American Indian/Alaskan Native	100 %	0 %	
Asian/Pacific Islander	50.0 %	50.0 %	
Multiple Races	64.3 %	35.7 %	
Graduated College	50.0 %	50.0 %	0.28
Some College	80.8 %	19.2 %	
High School	66.7 %	33.3 %	
9^{th} – 11^{th} Grade or Lower	70.6 %	29.4 %	
Ever Been in Prison	77.4 %	22.6 %	0.03*
Never Been in Prison	58.1 %	41.9 %	
Homeless One Month or Less	76.2 %	23.8 %	0.19
Homeless 2 to 12 Months	57.9 %	42.1 %	
Homeless More Than One Year	74.4 %	25.6 %	

* $p<.05$

Willingness to Be Screened for Hepatitis C

Table 4 depicts the willingness to be screened by the variables of gender, age, race, education level, prison, and length of time homeless. Overall, women (74.3%) were more willing to be screened than men (67.1%). Both White and Black participants indicated a 70% willingness to be screened, with Hispanics slightly lower at 66.7%. Those aged 31 to 50 had the highest percentage of willingness (34.4%) as compared to other age groups, and those with some college education had the highest percentage (80.8%) as compared with any of the other educational groupings or any strata – including gender and age. The age group that indicated the lowest interest in screening where those with a college degree, who were evenly divided at 50%

between being willing to be screened or not. The participants who indicated they had been in prison showed a higher willingness to be screened (77.4%) as compared with their peers who stated they had never been incarcerated. The previous prison experience variable is the only variable with statistical significance (p=0.03). In the final grouping by length of time homeless, both those who had been homeless for one month or less (76.2%) as well as those who had indicated they had been homeless for more than a year (74.4%) both showed a stronger willingness to be screened as compared with those who have experienced homelessness between two and twelve months (57.9%).

Factors that Predict Willingness to be Screened

We explored which potential predictive factors surfaced as the most salient when controlling for all factors simultaneously in a multivariate logistic regression model. Table 5 shows the results of the baseline model that examined age, gender, and education. Model 2 added having time spent in prison to the baseline model, Model 3 added included previous Hepatitis C testing and Model 4 added whether or not having had a doctor visit within the past year could predict the willingness of a person experiencing homelessness to be screened.

All models indicate that age was not associated with willingness to be screened, with all point estimates close to 1.00. Increased level of education appears to have a modest association with one's willingness to be screened, with ORs ranging from 0.98 to 1.14 yet all 95% CIs crossed 1.00 in each model. Males appear to be more willing to be screened (ORs ranged from 1.90 to 2.9) yet 95% CIs all included 1.00 in the models. Among those who have not spent time in prison, they were 39% less willing to be screened (95% CI 0.15-0.98), compared to those who had served in Model 2, yet this effect was attenuated somewhat in Models 3 and 4 when accounting for having been tested before and/or having seen a doctor in the past year. Similarly,

those who have not had a Hepatitis C test in the past were 44% (95% CI 0.23-0.85; Model 3) or 46% (95% CI 0.23-0.91, Model 4) less willing to be screened than those who have been previously tested. Lastly, having seen a doctor in the past 12 months did not appear to have an influence on willingness to be screened.

Table 5. Multivariate Analysis of Predictors of Willingness to be Screened

	Univariate		**Baseline Model[1]**		**Model 2**		**Model 3**		**Model 4**	
	OR	***95% CI***	***OR***	***95% CI***	***OR***	***95% CI***	***OR***	***95% CI***	***OR***	***95% CI***
Age	1.01	0.97-1.04	1.02	0.98-1.1	1.02	0.98-1.05	1.01	0.98-1.05	1.01	0.97-1.05
Sex Males vs Females	1.40	0.57-3.50	1.90	0.70-5.1	2.29	0.80-6.49	2.26	0.63-5.18	2.24	0.73-6.85
Education	1.08	0.81-1.43	1.14	0.84-1.6	1.07	0.79-1.46	1.00	0.77-1.45	0.98	0.72-1.37
History of Prison No vs Yes	**0.41**	**0.17-0.95**			**0.39**	**0.15-0.98**	**0.42**	**0.15-1.07**	0.40	0.15-1.07
Tested Before Yes vs No	**0.39**	**0.20-0.75**					**0.46**	**0.23-0.90**	**0.46**	**0.23-0.91**
Doctor Visit w/in 1 year Yes vs No	0.89	0.60-1.34							0.97	0.62-1.53

[1] *All models simultaneously adjusted for all variables.*

Discussion

Multivariate analyses revealed that those who were tested before were far less likely to express willingness to be tested again (OR=0.46 Model 3; OR=0.46 Model 4) as were those who did not have a history of being in prison (OR=0.39, Model 2; OR=.42 Model 3). The implications of these findings are that those who have been tested do not see the need, which is problematic if they continue high risk behaviors. Other potential predictors (i.e., sex, education, doctor visit within one year) were not associated with willingness to be tested when controlling for all variables.

In this cross-sectional study of 120 residents of five homeless shelters across Connecticut, we found that most participants were less informed about specific aspects of Hepatitis C compared to how they reported their overall understanding. That is, on the general knowledge question, most (83%) survey participants indicated they knew about Hepatitis C yet the mean score was 48.6% for the 10-item quiz. This finding of poor specific knowledge is consistent with the literature regarding the general population (Vermunt, 2015). A number of studies in different countries reported that the general population correctly answered between 40% and 60% of knowledge questions surrounding Hepatitis C (Vermunt, 2015). In our study, the least known fact about Hepatitis C was the misbelief that there is a vaccine for Hepatitis C with only 18.3% (n= 22) correctly answering the question that there is no vaccine. Similarly, the understanding that Hepatitis C affects the liver was answered correctly by only 27.5% (n=33) of those surveyed.

The length of time stayed at their current shelter was not clearly answered. The original question on the survey asked what date the person arrived at the shelter. However, this question was not approved during the IRB process as it could be an identifying data point. The IRB

recommended that the question be modified to include a separate field for year, month, and day and is reflected in the final version of the survey shown in Appendix A. This question, however, generated many queries among the participants, and based on the responses many did not understand how to complete it. As a result, this information was not used for additional analysis.

There were a disproportionate number of Black respondents according to the general population which is estimated to be 10% in Connecticut (DataUSA, 2020). A quarter of the respondents (n=30) were Black as compared to 46% (n=53) White, which reflects the homeless population overall where Blacks are overrepresented in the homeless system.

Who is Willing to Be Screened?

Among those experiencing homelessness, our descriptive findings revealed that the groups most willing to be screened were: women (74.3%), those aged 31 – 50 years (34.4%), and those who have been to prison (77.4%), and, those with some college education (80.8%). Of concern, youth, aged 18 to 24, exhibited very low willingness to be screened (5.4%) given that the CDC has reported that Hepatitis C infections have tripled in the past few years as a result of the opioid crisis among the younger generations (CDC, 2018). The analysis revealed there was not a clear trend. Those who had spent the most time in shelter had roughly the same percentage of willingness to be screened as those who had only spent one month in shelter.

Knowledge Status

The general Hepatitis C knowledge quiz revealed that the overall mean score was a 'low' grade (48.6%), perhaps indicating that there are substantial opportunities for providers to educate their homeless patients about this disease on a regular basis. According to the most recent Hepatitis C guidelines, risk-based Hepatitis C testing alone is not effective nor recommended (Spach, 2020). The conversation must be on-going, and according to the latest recommendation

in March of 2020 of the U.S. Preventative Services Task Force (USPSTF), routine screening for all adults aged 18 to 79 is recommended (Spach, 2020). Although most adults will require only one screening, periodic screening is recommended for those with on-going risk, such as those experiencing homelessness. The data from this study present an opportunity to educate providers about the importance of discussions with patients who are experiencing homelessness regarding the risks and need for screenings and treatment.

There were a few people (n=12) who indicated they wanted the researcher to ask them the questions since they couldn't read the survey (did not have their reading glasses or could not read). The researcher anticipated that this may result in a hesitancy or unwillingness to respond 'Yes' to some questions, including if they spent time in prison, in front of the researcher. This was not the case, and many of the respondents had no qualms about sharing they spent time in prison. The researcher, however, did suspect that a few individuals may have falsely stated they had attended college, or attended some college, based upon their body language and hesitancy in answering that question.

Qualitative Observations and Lessons Learned

During discussions after the survey, several residents indicated that they were interested in finding out more about Hepatitis C and if they were at risk. Many indicated that the shelters require them to leave by 8am, and without employment or other places to go during the day, said that they often choose to go to the drug dealers a few streets away from the shelter as a means of passing time and as a way to cope with their bleak situation. Learning that Hepatitis C is frequently spread by the sharing of intravenous drug needles and other equipment was of particular interest. The knowledge quiz in the survey revealed that most respondents know this fact, yet are unaware of the dangers and lack of symptoms of Hepatitis C.

Some residents had confused Hepatitis B with Hepatitis C, again illustrating the lack of knowledge about the disease. In any future study, it is recommended that informational flyers be distributed to the shelters about the topic after the survey is completed. The researcher answered questions, however, it would have been helpful to have documentation to distribute to seize the opportunity to provide education on the disease to the broader audience.

The questions about race and ethnicity posed more inquiries than expected. A number of respondents indicated no specific race or ethnicity, but merely indicated 'Puerto Rican' on the form. Others indicated 'Hispanic' for race and ethnicity, while some only indicated 'Hispanic' for the ethnicity but left the race field blank. As a result, the ethnicity field was not leveraged in the data analysis. Any future surveys may consider using a guided interview approach to collect the data.

Study Limitations

While this study was cross-sectional study and therefore, we cannot address causation, we can assume that the direction of most effects is logical because the predictors were stable characteristics (e.g., education, sex, age). Yet, factors such as having seen a doctor recently indicating a greater willingness to be screened, could reflect having prior knowledge about Hepatitis C or other health matters as the trigger to visit the doctor. The study included a convenience sample of people experiencing homelessness who volunteered to take the survey, which may introduce self-selection bias. The impact might be a higher response rate for indicating knowledge about the topic and a higher reported willingness to be screened than the general public. Since the study collected data on both the independent and dependent variables from the same respondents at one point in time, the potential for common method bias and false internal consistency might be present in the data. The best counter to this would be to leverage a

separate data source, however, given the nature of this study this was not feasible as no external data source exists for this population for the questions asked.

Questions specifically related to current or past substance use were omitted from this study primarily for facilitation of IRB submission and the HIPAA standards in an effort not to delay the IRB process for this survey, but should be asked in future research as they pertain directly to the transmission of Hepatitis C. Given that only a handful of shelters were logistically feasible to survey for this study, sampling bias may be a factor as the survey was only administered in five shelters in Connecticut out of 63 emergency shelters in the state. Although effort was be made to include a representative sample of shelters across each of the seven coordinated access networks in the state, not every shelter responded to the request to conduct the survey despite several email and phone call attempts. It is possible that the clients who answered the survey do not represent the diversity of this population. The researcher attempted to obtain a minimum of 140 surveys to allow for ten cases for each predictor variable, yet the number of usable surveys collected totaled 120. Although the response rates for completion of the survey were very high overall, the lower collection rate may be attributed to the fact that there were two relatively warm winter evenings when the survey was conducted, potentially leading fewer people into shelters on those nights.

Conclusions

Implications for Public Health Practice and Policy

This research has significant public health implications as it will fill an important research gap in the literature. No studies to our knowledge addressed the association of the awareness of Hepatitis C risks and transmission among those experiencing homelessness and their willingness to get screened for the deadly virus. Perhaps more importantly, the results of

this research could inform interventions and policy around this vulnerable and marginalized population that is highly likely to have Hepatitis C. For example, shelters could offer informational flyers concerning the risks of Hepatitis C and the need to be screened. Providers could play a more active role in discussing this disease with homeless patients and encouraging testing at frequent intervals. Long-term policy changes could involve the frequency of screenings in convenient locations as well as increased funding by insurance companies. Working together, the currently fragmented standards would be standardized to ensure frequent and fully-covered screenings for this vulnerable population.

In 2017, the Infectious Diseases Society of America (IDSA) and the American Association for the Study of Liver Disease (AASLD) published new guidelines on the treatment of Hepatitis C (AASLD IDSA, 2018). These new guidelines detail the use of a new short duration treatment option, unlike the older, long-term previous treatment such as interferon-based therapy. Much of the research conducted after these new guidelines focuses on the benefits of the new Direct-Acting Antiviral (DAA) treatment and the potential to exponentially reduce the burden of HCV. This new treatment would be better suited for the homeless population not only because of the shorter treatment duration, but also because it has high rates of clinical effectiveness and few side effects (Aisyah et al., 2018). This further necessitates the need for screening those experiencing homelessness and the need for additional research to understand the best strategies to maximize screening and, ultimately, treatment participation.

Moreover, with the advent of the Medicaid expansion program, many states provide low-income adults with greater access to healthcare services. Although a broad number of states cover treatment of Hepatitis C, many still impose restrictions that prevent access. According to a report in 2018, 12 states only covered treatment for those with advanced liver fibrosis, 9 states

required treatment to be prescribed by a liver disease specialist, and 20 states require a six-month period of abstinence from drug or alcohol use (Long, 2018). These policies, many of which are not evidence-based, must be reviewed and modified to become more inclusive in order to provide access to treatment for the deadliest blood-borne disease in the US.

The ultimate public health goal of this research, however, is to reduce and eventually eliminate HCV transmission per WHO goals. Given that the prevalence of HCV is high among people who inject drugs, combined with the fact that intravenous drug use is rising, particularly with the opioid epidemic, examining the awareness and knowledge of this disease is essential among marginalized populations, particularly those experiencing homelessness.

HCV screening is a low-cost and effective intervention, and even routine HCV screening is considered cost-effective in this population given the high incidence of intravenous drug use. Under the Affordable Care Act (ACA), preventive screening for Hepatitis C is covered (HHS, 2016). Identifying the extent to which the homeless population understands the health risks of HCV and behaviors that lead to HCV transmission should help target programs and educational material to this community. Moreover, policy changes could help improve healthcare coverage for treatment, which is expensive, for those experiencing homelessness which would have a significant impact on public health.

This awareness, combined with convenient screening and treatment locations designed specifically for this population, could significantly reduce the spread of this deadly disease, lower overall medical costs since patients would be treated early in the disease, and decrease and eventually eliminate the prevalence of HCV, thereby making a considerable impact on the public health practice. Hepatitis C often has a stigma attached to it, resulting in a hesitation or avoidance of discussion around the topic. This initial phase of research would help to start the

conversation on this topic and provide data that reveal the need to educate, screen, and treat the homeless population, which is highly likely to have this disease.

The analysis of the existing literature reveals that more research is needed to identify what targeted strategies should be leveraged to increase Hepatitis C screening among vulnerable populations. One study focuses on addressing health disparities in Hepatitis C screening, and although not specifically focused on the homeless population, this study provides insight into general best practices for racial and ethnic minorities as well as the socio-economically disadvantaged (Jain et al., 2019). These insights include an educational component, an automatic alert in an electronic medical record (EMR) to notify the provider when a patient attended a clinic and had no prior HCV antibody recorded in the system and increasing clinic capacity to evaluate patients. Other studies focus on community screening programs targeted to those experiencing homelessness and the need to tailor services for this population in order to encourage follow-up visits with primary care providers (Fuster & Gelberg, 2019).

Each study provides unique insights, but few provide clear, targeted strategies. Further research is warranted not only because the topic is timely, as targeted populations have grown, but also because many of these populations include people experiencing homelessness. Defining a clear strategy for screening would help prevent the spread of HCV. To do so, however, it is imperative to understand what factors predict the willingness of a person experiencing homeless to get screened for Hepatitis C in the first place. Understanding these factors, or the general level of awareness of the disease, is a critical step in developing programs to help this population realize the severity of the disease and the importance of early screening and treatment.

Appendix A. Survey

HEPATITIS C SURVEY

Thank you for your willingness to complete this short survey. These questions will help us to understand how much is known about Hepatitis C and clients' willingness to learn more about this disease. All responses are completely confidential and will not be shared with anyone, including here at the shelter. This information will be used entirely for research purposes.

Questions with an * indicate these questions are required, but you may skip any questions that you do not feel comfortable answering. Completion and return of the survey imply voluntary participation. You may place your completed survey in the secure box provided.

Research question: Which factors predict willingness of a person experiencing homelessness to be screened for Hepatitis C?

GENERAL QUESTIONS

1. ***What is your age?** _____

2. ***What is your gender?**
   - ○ Male
   - ○ Female
   - ○ Prefer not to answer
   - ○ Other (please specify) _____

3. ***Which race best describes you? (Please choose only one.)**
   - ○ American Indian or Alaskan Native
   - ○ Asian / Pacific Islander
   - ○ Black or African American
   - ○ White/Caucasian
   - ○ Multiple races (please specify) _____

4. ***Which ethnicity best describes you? (Please choose only one.)**
   - ○ Hispanic/Latino
   - ○ Non-Hispanic/Non-Latino

5. ***What is the highest level of education you have completed?**
   - ○ Did not attend school
   - ○ 9th grade or lower
   - ○ 10th grade
   - ○ 11th grade
   - ○ Graduated from high school
   - ○ Some college
   - ○ Graduated from college

6. ***How long have you been in this shelter?** _____years _____months _____days

7. ***How long have you been homeless?**
   - ○ Less than one week
   - ○ One month
   - ○ 2 to 6 months
   - ○ 6 to 12 months
   - ○ More than one year

8. ***Have you ever been to prison?**
   - ○ Yes
   - ○ No
   - ○ Prefer not to answer

QUESTIONS ABOUT HEPATITIS C

9. ***Do you know what Hepatitis C is?**
   - ○ Yes
   - ○ No
   - ○ Not sure

10. **If you answered 'Yes' to Question 9, where did you hear about Hepatitis C?**
    - ○ Doctor
    - ○ Friend
    - ○ Family
    - ○ Other (please specify) _____

11. *Have you ever been tested for Hepatitis C?

- Yes
- No
- I don't know

12. *Do you have Hepatitis C?

- Yes
- No
- I don't know
- Prefer not to answer

13. *When was your most recent doctor's visit?

- Within the past month
- Within the past six months
- Within the past year
- I haven't seen a doctor in the past year
- I haven't seen a doctor in the past 5 years
- Other (please specify) _____

Please select the answer that best describes your understanding of the following:				
14.	*Hepatitis C is a contagious disease.	**True**	**False**	**Unsure**
15.	*Fatigue is a common symptom of early stages of Hepatitis C.	**True**	**False**	**Unsure**
16.	*A common way people become infected with Hepatitis C is by sharing needles and other equipment to inject drugs.	**True**	**False**	**Unsure**
17.	*There is a vaccine for Hepatitis C.	**True**	**False**	**Unsure**
18.	*Hepatitis C is a serious, long-term illness if not treated.	**True**	**False**	**Unsure**
19.	*Most people who have Hepatitis C do not feel sick.	**True**	**False**	**Unsure**
20.	*If I already had a Hepatitis C screening test in the past I do not need to be tested again.	**True**	**False**	**Unsure**
21.	*There is no benefit to getting treatment for Hepatitis C if I continue to use intravenous drugs.	**True**	**False**	**Unsure**
22.	*Hepatitis C only affects the liver.	**True**	**False**	**Unsure**

23.	*Treatment for Hepatitis C involves taking only one pill.	**True**	**False**	**Unsure**

How likely are you to do each of the following?

	Not at all likely	**Somewhat Unlikely**	**Neither likely nor unlikely**	**Somewhat Likely**	**Very Likely**
24. *Go to a Hepatitis C screening at a local hospital.	1	2	3	4	5
25. *Go to a Hepatitis C screening at a local health clinic.	1	2	3	4	5
26. *Go to a Hepatitis C screening at my shelter.	1	2	3	4	5
27. *Get treatment for Hepatitis C if the screening revealed I had it.	1	2	3	4	5
28. Seek help to stop substance abuse (if applicable).	1	2	3	4	5

Thank you for your participation in this survey. Your answers will remain completely confidential and will not be shared with anyone.

Appendix B. Hepatitis C Quiz Responses by Gender

Correct responses shown in bold.

	Male			**Female**		
	True	**False**	**Unsure**	**True**	**False**	**Unsure**
Q1. Hepatitis C is a contagious disease.	**57 (49)**	10 (8.6)	12 (10.3)	**30 (25.9)**	3 (2.6)	4 (3.5)
Q2. Fatigue is a common symptom of early stages of Hepatitis C.	**33 (29.2)**	9 (8.0)	34 (30.1)	**22 (19.5)**	3 (2.7)	12 (32.7)
Q3. A common way people become infected with Hepatitis C is by sharing needles and other equipment to inject drugs.	**66 (56.9)**	3 (2.6)	9 (7.8)	**34 (29.3)**	4 (3.5)	3 (2.6)
Q4. There is a vaccine for Hepatitis C.	42 (35.9)	**15 (12.8)**	22 (18.8)	21 (18)	**7 (6.0)**	10 (8.6)
Q5. Hepatitis C is a serious, long-term illness if not treated.	**52 (46.4)**	6 (5.4)	18 (16.1)	**27 (24.1)**	2 (1.8)	7 (6.3)
Q6. Most people who have Hepatitis C do not feel sick.	**32 (28.1)**	20 (17.5)	26 (22.8)	**18 (15.8)**	7 (6.1)	11 (9.7)
Q7. If I already had a Hepatitis C screening test in the past I do not need to be tested again.	17 (14.7)	**39 (33.6)**	22 (19.0)	8 (6.9)	**18 (15.5)**	12 (10.3)
Q8. There is no benefit to getting treatment for Hepatitis C if I continue to use intravenous drugs.	15 (13.2)	**37 (32.5)**	24 (21.1)	8 (7.0)	**17 (14.9)**	13 (11.4)
Q9. Hepatitis C only affects the liver.	**21 (18.1)**	23 (19.8)	34 (29.3)	**12 (10.3)**	14 (12.1)	12 (10.3)
Q10. Treatment for Hepatitis C involves taking only one pill.	13 (11.2)	**23 (19.8)**	42 (36.2)	3 (2.6)	**16 (13.8)**	19 (16.4)

Appendix C. Hepatitis C Quiz Responses by Education Level

Correct responses shown in bold.

	Graduated from College			**Completed Some College**			**Completed High School**			**Completed 11th Grade or Lower**		
	True	**False**	**Unsure**	**True**	**False**	**Unsure**	**True**	**False**	**Unsure**	**True**	**False**	**Unsure**
Q1. Hepatitis C is a contagious disease.	**13 (11.2)**	1 (0.9)	1 (12.9)	**20 (17.2)**	3 (2.6)	4 (3.5)	**29 (25)**	5 (4.3)	4 (3.5)	**25 (21.6)**	4 (3.5)	7 (6.0)
Q2. Fatigue is a common symptom of early stages of Hepatitis C.	**10 (8.9)**	0 (0)	5 (4.4)	**13 (11.5)**	3 (2.7)	11 (9.7)	**17 (15.0)**	5 (4.4)	13 (11.5)	**15 (13.2)**	4 (3.5)	17 (15.0)
Q3. A common way people become infected with Hepatitis C is by sharing needles and other equipment to inject drugs.	**12 (10.3)**	2 (1.7)	1 (0.9)	**22 (19.0)**	1 (0.9)	3 (2.6)	**34 (29.3)**	0 (0)	4 (3.5)	**32 (27.6)**	1 (0.9)	4 (3.5)
Q4. There is a vaccine for Hepatitis C.	7 (6.0)	**5 (4.3)**	3 (2.6)	14 (12.0)	**6 (5.1)**	7 (6.0)	20 (17.1)	**7 (6.0)**	11 (9.4)	22 (18.8)	**4 (3.4)**	11 (9.4)
Q5. Hepatitis C is a serious, long-term illness if not treated.	**12 (10.7)**	0 (0)	3 (2.7)	**19 (17.0)**	4 (3.6)	4 (3.6)	**21 (18.8)**	4 (3.6)	9 (8.0)	**27 (24.1)**	0 (0)	9 (8.0)
Q6. Most people who have Hepatitis C do not feel sick.	**5 (4.4)**	4 (3.5)	5 (4.4)	**14 (12.3)**	6 (5.3)	7 (6.1)	**14 (12.3)**	10 (8.8)	13 (11.4)	**17 (14.9)**	7 (6.1)	12 (10.5)
Q7. If I already had a Hepatitis C screening test in the past I do not need to be tested again.	2 (1.7)	**11 (9.5)**	2 (1.7)	5 (4.3)	**14 (12.1)**	8 (6.9)	8 (6.9)	**20 (17.2)**	9 (7.8)	10 (8.6)	**12 (10.3)**	15 (12.9)
Q8. There is no benefit to getting treatment for Hepatitis C if I continue to use intravenous drugs.	1 (0.9)	**8 (7.0)**	6 (5.3)	7 (6.1)	**12 (10.5)**	8 (7.0)	9 (7.9)	**17 (14.9)**	11 (9.7)	6 (5.3)	**17 (14.9)**	12 (10.5)
Q9. Hepatitis C only affects the liver.	**3 (2.6)**	8 (6.9)	4 (3.5)	**6 (5.2)**	8 (6.9)	12 (10.3)	**10 (8.6)**	12 (10.3)	16 (13.8)	**14 (12.1)**	9 (7.8)	14 (12.1)
Q10. Treatment for Hepatitis C involves taking only one pill.	2 (1.7)	**5 (4.3)**	8 (6.9)	4 (3.5)	**8 (6.9)**	14 (12.1)	4 (3.5)	**15 (12.9)**	19 (16.4)	6 (5.2)	**11 (9.5)**	20 (17.2)

Appendix D. Hepatitis C Quiz Responses by Age

Correct responses shown in bold.

	18-24 Years			**25-30 Years**			**31-50 Years**			**51 -71 Years**		
	True	**False**	**Unsure**	**True**	**False**	**Unsure**	**True**	**False**	**Unsure**	**True**	**False**	**Unsure**
Q1. Hepatitis C is a contagious disease.	**5 (4.3)**	4 (3.5)	3 (10.3)	**10 (8.6)**	2 (1.7)	1 (0.9)	**40 (34.5)**	3 (2.6)	7 (6.0)	**32 (27.6)**	4 (3.5)	5 (4.3)
Q2. Fatigue is a common symptom of early stages of Hepatitis C.	**6 (5.3)**	1 (0.9)	4 (3.5)	**7 (6.2)**	0 (0)	6 (5.3)	**20 (17.7)**	7 (6.2)	22 (19.5)	**22 (19.5)**	4 (3.5)	14 (12.4)
Q3. A common way people become infected with Hepatitis C is by sharing needles and other equipment to inject drugs.	**8 (6.9)**	0 (0)	4 (3.5)	**13 (11.2)**	0 (0)	0 (0)	**45 (38.8)**	1 (0.9)	4 (3.5)	**34 (29.3)**	3 (2.6)	4 (3.5)
Q4. There is a vaccine for Hepatitis C.	7 (6.0)	**1 (0.9)**	4 (3.4)	6 (5.1)	**1 (0.9)**	6 (5.1)	31 (26.5)	**10 (8.6)**	10 (8.6)	19 (16.2)	**10 (8.6)**	12 (10.3)
Q5. Hepatitis C is a serious, long-term illness if not treated.	**6 (5.4)**	2 (1.8)	4 (3.6)	**7 (6.3)**	1 (0.9)	5 (4.5)	**35 (32.3)**	4 (3.6)	8 (7.1)	**31 (27.7)**	1 (0.9)	8 (7.1)
Q6. Most people who have Hepatitis C do not feel sick.	**4 (3.5)**	3 (2.6)	4 (3.5)	**4 (3.5)**	2 (1.8)	5 (4.5)	**23 (20.2)**	14 (12.3)	14 (12.3)	**19 (16.7)**	8 (7.0)	14 (12.3)
Q7. If I already had a Hepatitis C screening test in the past I do not need to be tested again.	0 (0)	**4 (3.5)**	7 (6.0)	4 (3.5)	**6 (5.2)**	3 (2.6)	11 (9.5)	**26 (22.4)**	14 (12.1)	10 (8.6)	**21 (18.1)**	10 (8.6)
Q8. There is no benefit to getting treatment for Hepatitis C if I continue to use intravenous drugs.	3 (2.6)	**5 (4.4)**	4 (3.5)	2 (1.8)	**4 (3.5)**	6 (5.3)	9 (7.9)	**28 (24.6)**	13 (11.4)	9 (7.9)	**17 (14.9)**	14 (12.3)
Q9. Hepatitis C only affects the liver.	**2 (1.7)**	5 (4.3)	5 (4.3)	**3 (2.6)**	4 (3.5)	6 (5.2)	**14 (12.1)**	17 (14.7)	19 (16.4)	**14 (12.1)**	11 (9.5)	16 (13.8)
Q10. Treatment for Hepatitis C involves taking only one pill.	2 (1.7)	**6 (5.2)**	1 (3.5)	0 (0)	**3 (2.6)**	10 (8.6)	8 (6.9)	**16 (13.8)**	27 (23.3)	6 (5.2)	**14 (12.1)**	20 (17.2)

Appendix E. Hepatitis C Quiz Grades by Gender, Education Level, and Age

		Hepatitis C Quiz Grade										
		0%	**10%**	**20%**	**30%**	**40%**	**50%**	**60%**	**70%**	**80%**	**90%**	**100%**
All		10 (8.3)	4 (3.3)	5 (4.2)	15 (12.5)	14 (11.7)	19 (15.8)	21 (17.5)	20 (16.7)	8 (6.7)	4 (3.3)	0 (0)
Gender	Male	7 (5.8)	3 (2.5)	4 (3.3)	10 (8.3)	13 (10.8)	15 (12.5)	13 (10.8)	10 (8.3)	4 (3.3)	3 (2.5)	0 (0)
	Female	3 (2.5)	1 (0.8)	1 (0.8)	5 (4.2)	1 (0.8)	4 (3.3)	8 (6.7)	10 (8.3)	4 (3.3)	1 (0.8)	0 (0)
Education Level	Graduated from College	1 (0.8)	0 (0)	1 (0.8)	0 (0)	1 (0.8)	2 (1.7)	5 (4.2)	2 (1.7)	3 (2.5)	0 (0)	0 (0)
	Some College	2 (1.7)	0 (0)	2 (1.7)	4 (3.3)	3 (2.5)	2 (1.7)	6 (5.0)	5 (4.2)	2 (1.7)	1 (0.8)	0 (0)
	High School or GED	2 (1.7)	3 (2.5)	0 (0)	6 (5.0)	5 (4.2)	10 (8.3)	5 (4.2)	4 (3.3)	1 (0.8)	3 (2.5)	0 (0)
	11^{th} Grade or Lower	5 (4.2)	1 (0.8)	2 (1.7)	5 (4.2)	5 (4.2)	5 (4.2)	5 (4.2)	9 (7.5)	2 (1.7)	0 (0)	0 (0)
Age	18 to 24 Years	4 (3.3)	0 (0)	0 (0)	1 (0.8)	1 (0.8)	1 (0.8)	1 (0.8)	3 (2.5)	1 (0.8)	0 (0)	0 (0)
	25 to 30 Years	0 (0)	1 (0.8)	1 (0.8)	1 (0.8)	3 (2.5)	4 (3.3)	1 (0.8)	2 (1.7)	0 (0)	0 (0)	0 (0)
	31 to 50 Years	2 (1.7)	1 (0.8)	1 (0.8)	3 (2.5)	3 (2.5)	3 (2.5)	10 (8.3)	8 (6.7)	3 (2.5)	2 (1.7)	0 (0)
	51 Years and Older	4 (3.3)	2 (1.7)	3 (2.5)	5 (4.2)	2 (1.7)	6 (5.0)	9 (7.5)	7 (5.8)	4 (3.3)	2 (1.7)	0 (0)

Appendix F. Survey Code Book

Question #	Question	Short Name	Code Values
Q1	Age	Age	The age of the person in years
Q2	Gender	Sex	1=Male 2=Female 3= Prefer not to answer 4=Other
Q3	Race	Race	0=Hispanic 1=White/Caucasian 2= Black 3= American Indian or Alaskan Native 4= Asian/Pacific Islander 5= Multiple Races
Q4	Ethnicity	Ethn	1=Non-Hispanic/Non-Latino 2=Hispanic/Latino
Q5	Highest Education	Educ	1=Graduated from college 2=Some college 3=Graduated from high school 4=11th grade 5=10th grade 6= 9th grade or lower 7=Did not attend school
Q6	Q6A How long have you been at this shelter? YEARS	Year	The number of years the person has been at this shelter
	Q6B How long have you been at this shelter? MONTHS	Month	The number of months the person has been at this shelter
	Q6C How long have you been at this shelter? DAYS	Day	The number of days the person has been at this shelter
Q7	How long have you been homeless	HowLong	1=Less than one week 2=One month 3=2 to 6 months 4=6 to 12 months 5=More than one year
Q8	Have you ever been to prison?	Prison	1=Yes 2=No 3=Prefer not to answer
Q9	Do you know what Hepatis C is?	KnowHepC	1=Yes 2=No 3=Not sure
Q10	If yes to Q9, where did you hear about Hepatitis C?	Wherehear	1=Doctor 2=Friend

Question #	Question	Short Name	Code Values
			3=Family 4=Other School, TV, Program, Prison, I had it/have it, Internet, Social Media
Q11	Have you ever been tested for Hepatitis C?	TestHepC	1=Yes 2=No 3=Don't know
Q12	Do you have Hepatitis C?	HaveHepC	1=Yes 2=No 3=Don't know 4=Prefer not to answer
Q13	When was your most recent doctor's visit?	DocVisit	1=Within past month 2=Within past 6 months 3=Within the past year 4=I haven't seen a doctor in the past year 5= I haven't seen a doctor in the past 5 years 6=Other
Q14	Hepatitis C is a contagious disease.	Contag	1=True 2=False 3=Unsure
Q15	Fatigue is a common symptom of early stages of Hepatitis C.	Fatigue	1=True 2=False 3=Unsure
Q16	A common way people become infected with Hepatitis C is by sharing needles and other equipment to inject drugs.	Needles	1=True 2=False 3=Unsure
Q17	There is a vaccine for Hepatitis C.	Vaccine	1=True 2=False 3=Unsure
Q18	Hepatitis C is a serious, long-term illness if not treated.	Serious	1=True 2=False 3=Unsure
Q19	Most people who have Hepatitis C do not feel sick.	FeelSick	1=True 2=False 3=Unsure
Q20	If I already had a Hepatitis C screening test in the past I do not need to be tested again.	Retest	1=True 2=False 3=Unsure
Q21	There is no benefit to getting treatment for	IVBenefit	1=True 2=False

Question #	Question	Short Name	Code Values
	Hepatitis C if I continue to use intravenous drugs.		3=Unsure
Q22	Hepatitis C only affects the liver.	Liver	1=True 2=False 3=Unsure
Q23	Treatment for Hepatitis C involves taking only one pill.	OnePill	1=True 2=False 3=Unsure
How likely are you to do each of the following?			
Q24	Go to a Hepatitis C screening at a local hospital.	Hosp	1=Not at all likely 2=Somewhat unlikely 3=Neither likely nor unlikely 4=Somewhat likely 5=Very likely
Q25	Go to a Hepatitis C screening at a local health clinic.	Clinic	1=Not at all likely 2=Somewhat unlikely 3=Neither likely nor unlikely 4=Somewhat likely 5=Very likely
Q26	Go to a Hepatitis C screening at my shelter.	Shelter	1=Not at all likely 2=Somewhat unlikely 3=Neither likely nor unlikely 4=Somewhat likely 5=Very likely
Q27	Get treatment for Hepatitis C if the screening revealed I had it.	GetTreated	1=Not at all likely 2=Somewhat unlikely 3=Neither likely nor unlikely 4=Somewhat likely 5=Very likely
Q28	Seek help to stop substance abuse (if applicable).	SeekHelp	1=Not at all likely 2=Somewhat unlikely 3=Neither likely nor unlikely 4=Somewhat likely 5=Very likely
Language	Indicates whether the survey was in English or Spanish	Lang	1=English 2=Spanish
Location	Indicates the location of the survey	Loc	1=Open Hearth 2=St Vincent DePaul 3=Youth Continuum 4=Columbus House 5=New London Hospitality House
Quiz Score	New variable that sums the responses for the Hepatitis	Score	0 = Zero answers correct 1= 1 correct answer 2= 2 correct answers

Question #	Question	Short Name	Code Values
	C questions with 1 point for each correct value		3= 3 correct answers 4= 4 correct answers 5 = 5 correct answers 6= 6 correct answer 7= 7 correct answers 8= 8 correct answers 9= 9 correct answers 10 = 10 correct answers
Quiz Grade	New variable that multiples Score by 10 to get %	Grade	= Score * 100 Values 0 to 100%
EdCol	New variable to separate out those with a college degree	EdCol	1= Graduated from college
EdSomeColl	New variable created to separate out respondents with some college	EdSomeColl	2= Some college
EdGED	New variable created to separate out respondents with high school degree as highest education attained	EdGED	3 = Graduated from high school/GED
EdLow	New variable created to separate out respondents who completed 11^{th}, 10^{th}, 9^{th} grade or lower	EdLow	4 = Completed 11^{th}, 10^{th}, 9^{th} grade or lower
Edgroup	Single variable created to group together the 4 sub-categories of education level	Edgroup	Consists of all 4 education groups
Age1	New variable created to separate out youth aged 18 to 30 years	Age1	1= 18 -24 years
Age2	New variable created to separate out ages 25 to 30 years	Age2	2 = 25 to 30 years
Age3	New variable created to separate out ages 31 to 50 years	Age3	3 = 31 to 50 years
Age4	New variable created to separate out those 51 years and older	Age4	4 = 51 years and older
Agegroup	Single variable created to group together the 4 sub-categories of age	Agegroup	Consists of all 4 age groups
ScreenHospYES	New variable indicating respondent is willing to get screened at a hospital.	ScreenHospYES	1= Yes

Question #	Question	Short Name	Code Values
	Based on combining values 4 and 5.		
ScreenHospNO	New variable indicating respondent is not willing to get screened at a hospital. Based on combining values 1 and 2.	ScreenHospNO	2 =No
ScreenClinicYES	New variable indicating respondent is willing to get screened at a clinic. Based on combining values 4 and 5.	ScreenClinicYES	1= Yes
ScreenClinicNO	New variable indicating respondent is not willing to get screened at a clinic. Based on combining values 1 and 2.	ScreenClinicNO	2 =No
ScreenShelterYES	New variable indicating respondent is willing to get screened at a shelter. Based on combining values 4 and 5.	ScreenShelterYES	1= Yes
ScreenShelterNO	New variable indicating respondent is not willing to get screened at a shelter. Based on combining values 1 and 2.	ScreenShelterNO	2 =No
Willingness	New variable to group the willingness of respondents to get screened. Values 4 and 5 grouped, and values 1 and 2 grouped. Likert scale value 3 not used as it was a neutral response.	Willingness	1= Willing to get screened 2= Not willing to get screened

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